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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.
09/206,027	12/04/98	COHEN	B AMAT/3049/MD

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IM22/1204

EXAMINER

VINH, L

ART UNIT	PAPER NUMBER
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1765

DATE MAILED:

12/04/00

Please find below and/or attached an Office communication concerning this application or proceeding.

Commissioner of Patents and Trademarks

Office Action Summary

Application No.
09/206,027

Applicant(s)

Cohen et al.

Examiner
Lan Vinh

Group Art Unit
1765



☒ Responsive to communication(s) filed on 10/11/00

☒ This action is **FINAL**.

☐ Since this application is in condition for allowance except for formal matters, **prosecution as to the merits is closed** in accordance with the practice under *Ex parte Quayle*, 35 C.D. 11; 453 O.G. 213.

A shortened statutory period for response to this action is set to expire 3 month(s), or thirty days, whichever is longer, from the mailing date of this communication. Failure to respond within the period for response will cause the application to become abandoned. (35 U.S.C. § 133). Extensions of time may be obtained under the provisions of 37 CFR 1.136(a).

Disposition of Claim

- ☒ Claim(s) 1, 3-8, and 10-30 is/are pending in the application.
- Of the above, claim(s) _____ is/are withdrawn from consideration.
- ☐ Claim(s) _____ is/are allowed.
- ☒ Claim(s) 1, 3-8, and 10-30 is/are rejected.
- ☐ Claim(s) _____ is/are objected to.
- ☐ Claims _____ are subject to restriction or election requirement.

Application Papers

- ☐ See the attached Notice of Draftsperson's Patent Drawing Review, PTO-948.
- ☐ The drawing(s) filed on _____ is/are objected to by the Examiner.
- ☐ The proposed drawing correction, filed on _____ is ☐ approved ☐ disapproved.
- ☐ The specification is objected to by the Examiner.
- ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. § 119

- ☐ Acknowledgement is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d).
- ☐ All ☐ Some* ☒ None of the CERTIFIED copies of the priority documents have been
- ☐ received.
- ☐ received in Application No. (Series Code/Serial Number) _____.
- ☐ received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

*Certified copies not received: _____

- ☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. § 119(e).

Attachment(s)

- ☒ Notice of References Cited, PTO-892
- ☒ Information Disclosure Statement(s), PTO-1449, Paper No(s). 10
- ☐ Interview Summary, PTO-413
- ☐ Notice of Draftsperson's Patent Drawing Review, PTO-948
- ☐ Notice of Informal Patent Application, PTO-152

--- SEE OFFICE ACTION ON THE FOLLOWING PAGES ---

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DETAILED ACTION

1. All of the documents presented in the IDS filed on 10/13/2000 have been considered. However, two documents DE 19751785 A1 and DE 19521150A1 have not been considered because there are no translation provided.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 1, 5, 6, 7 are rejected under 35 U.S.C 103(a) as being unpatentable over Konecni et al. (EP 0849 779 A2).

Konecni discloses a process for forming a semiconductor structure using plasma etching comprising exposing a patterned substrate surface to a plasma consisting of argon, helium, hydrogen in a processing chamber (col 6, lines 40-47 and fig. 4).

Unlike the instant claimed invention as per claim 1, Konecni does not specifically disclose the percent by volume (etchant concentration) of argon.

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However, in a method of plasma etching, it is well known that etching parameters such as etchant concentration, temperature, and flow rate affect both the rate and quality of the plasma etching process.

Therefore, it is the examiner's position that it would have been obvious to adjust Konecni's etchant concentration by optimizing the same by conducting routine experimentation for the purpose of obtaining the best result.

Regarding claim 5, Konecni discloses that the substrate surface comprises silicon oxide (col 5, lines 24-26)

Regarding claims 6, Konecni discloses that the plasma is capacitively and inductively powered by bias power (col 3, lines 42-44).

Regarding claims 7, Konecni discloses introducing argon, helium, hydrogen into the processing chamber to establish a low or vacuum pressure (10^{-7} Torr to 10^{-8} Torr) (col 4, lines 34-35; col 6, lines 30-45).

4. Claim 3 is rejected under 35 U.S.C 103(a) as being unpatentable over Konecni et al. (EP 0849 779 A2).

Konecni discloses a process for forming a semiconductor structure using plasma etching comprising exposing a patterned substrate surface to a plasma consisting of argon, helium, hydrogen in a processing chamber (col 6, lines 40-47 and fig. 4).

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Unlike the instant claimed invention as per claim 3, Konecni does not specifically disclose the percent by volume (etchant concentration) of helium and hydrogen.

However, in a method of plasma etching , it is well known that etching parameters such as etchant concentration, temperature, and flow rate affect both the rate and quality of the plasma etching process.

Therefore, it is the examiner's position that it would have been obvious to adjust Konecni's etchant concentration by optimizing the same by conducting routine experimentation for the purpose of obtaining the best result.

5. Claim 4 is rejected under 35 U.S.C 103(a) as being unpatentable over Konecni et al. (EP 0849 779 A2) in view of Jen (US 5,773,367).

Konecni has been described above in paragraph 3. Unlike the instant claimed invention as per claim 4, Konecni does not specifically disclose the step of increasing the helium content of the plasma to increase etching of the patterned substrate surface.

However, Jen discloses a method to plasma etching an oxide layer comprises the step of increasing the helium flow rate (content) to increase the etch rate of the patterned oxide surface (col 6, lines 4-9 and Fig. 7A).

Therefore, one skilled in the art would have found it obvious to modify Konecni's process by adding the step of increasing the flow rate (content) of helium to increase the etch rate of the patterned oxide surface as per Jen because Konecni states that bombardment of a material with

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inert ion (helium) increases the reactive surface area of the material accessible to reactive (etching) hydrogen ions (col 7, lines 5-8).

6. Claims 8, 10-23 are rejected under 35 U.S.C 103(a) as being unpatentable over Konecni et al. (EP 0849 779 A2) in view of Jen (US 5,773,367).

Konecni discloses a process for forming a semiconductor structure using plasma etching comprising exposing a patterned substrate surface to a plasma consisting of argon, helium, hydrogen in a processing chamber (col 6, lines 40-47 and fig. 4)

Unlike the instant claimed invention as per claims 8, 14, Konecni does not specifically disclose the percent by volume (etchant concentration) of argon. In addition, Konecni does not specifically disclose the step of increasing the helium content of the plasma to increase etching of the patterned substrate surface.

However, in a method of plasma etching , it is well known that etching parameters such as etchant concentration, temperature, and flow rate affect both the rate and quality of the plasma etching process.

Therefore, it is the examiner's position that it would have been obvious to adjust Konecni's etchant concentration by optimizing the same by conducting routine experimentation for the purpose of obtaining the best result.

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Jen discloses a method to plasma etching an oxide layer comprises the step of increasing the helium flow rate (content) to increase the etch rate of the patterned oxide surface (col 6, lines 4-9 and Fig. 7A).

Therefore, one skilled in the art would have found it obvious to modify Konecni's process by adding the step of increasing the flow rate (content) of helium to increase the etch rate of the patterned oxide surface as per Jen because Konecni states that bombardment of a material with inert ion (helium) increases the reactive surface area of the material accessible to reactive (etching) hydrogen ions (col 7, lines 5-8).

Regarding claims 11, 16, Konecni discloses that the substrate surface comprises silicon oxide (col 5, lines 24-26)

Regarding claims 12, 14, Konecni discloses that the plasma is capacitively and inductively powered by bias power (col 3, lines 42-44).

Regarding claims 13, 17, Konecni discloses introducing argon, helium, hydrogen into the processing chamber to establish a low or vacuum pressure (10^{-7} Torr to 10^{-8} Torr) (col 4, lines 34-35; col 6, lines 30-45).

Regarding claims 21-23, Konecni discloses generating the plasma by delivering power level of between 150-450 W to the processing chamber (col 3, lines 40-43).

7. Claims 24, 25, 27-30 are rejected under 35 U.S.C 103(a) as being unpatentable over Konecni et al. (EP 0849 779 A2).

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Konecni discloses a process for forming a semiconductor structure using plasma etching comprising exposing a patterned substrate surface to a plasma consisting of argon, helium, hydrogen in a processing chamber (col 6, lines 40-47 and fig. 4).

Unlike the instant claimed invention as per claim 24, Konecni does not specifically disclose the percent by volume (etchant concentration) of argon, helium and hydrogen.

However, in a method of plasma etching , it is well known that etching parameters such as etchant concentration, temperature, and flow rate affect both the rate and quality of the plasma etching process.

Therefore, it is the examiner's position that it would have been obvious to adjust Konecni's etchant concentrations by optimizing the same by conducting routine experimentation for the purpose of obtaining the best result.

Regarding claim 27, Konecni discloses that the substrate surface comprises silicon oxide (col 5, lines 24-26)

Regarding claim 25, Konecni discloses that the plasma is capacitively and inductively powered by bias power (col 3, lines 42-44).

Regarding claim 28, Konecni discloses introducing argon, helium, hydrogen into the processing chamber to establish a low or vacuum pressure (10^{-7} Torr to 10^{-8} Torr) (col 4, lines 34-35; col 6, lines 30-45).

Regarding claim 30, Konecni discloses generating the plasma by delivering power level of between 150-450 W to the processing chamber (col 3, lines 40-43).

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Response to Arguments

8. Applicant's arguments with respect to claims 1, 3-8, 10-30 have been considered but are moot in view of the new ground(s) of rejection.

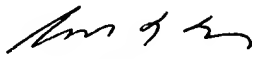
9. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

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Conclusion

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Lan Vinh whose telephone number is (703) 305-6302. If attempts to reach the examiner are unsuccessful, the examiner's supervisor, Benjamin Utech, can be reached on (703) 308-3836. The official fax number for the organization is (703) 305-3599.


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November 29, 2000